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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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EXAMINER

ART UNIT

PAPER NUMBER

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

# Office Action Summary

Application No.

08/866,129

Applicant(s)

Uemura et al.

Examiner

Douglas Wille

Group Art Unit

2814



☒ Responsive to communication(s) filed on Sep 20, 2000

☒ This action is **FINAL**.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

## Disposition of Claims

☒ Claim(s) 1, 2, 4-14, and 20-26 is/are pending in the application.

Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 1, 2, 4-14, and 20-26 is/are rejected.

☐ Claim(s) \_\_\_\_\_ is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). \_\_\_\_\_

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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## **DETAILED ACTION**

### ***Finality of Prior Office Action***

1. Finality of the Office Action dated 4/11/00 is withdrawn.

### ***Supplemental Figures***

2. Receipt of the supplemental Figures is acknowledged and the following comments are provided. First, it is noted that there is a difference in the distribution of Au and Ni for different processing conditions as shown in the Figures. Applicant refers to the medium of the plots while apparently meaning the median. In Figure A-5 the median for Ni is clearly misplaced. The constituents of the no oxygen atmosphere are not indicated.
3. While the supplemental Figures show the reversal in an oxygen atmosphere they do not show that the atmosphere used by Nakamura does not show the reversal. It is noted that the specification shows that any combination of the listed gasses (page 16) is sufficient and since Nakamura et al. use the listed gasses it may be concluded that similar processing will produce similar results.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claims 1, 2, 4 - 11 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 1 shows three metal layers of the pad and shows the limitation on the depth of the first and second metal layers in the substrate. Note, however, that it is the metals in the electrode layer that show the depth effect and that the reversal does not occur where there is an overlying electrode pad. Thus the limitation is not in agreement with the specification.

***Claim Rejections - 35 USC § 102***

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 12 - 14 and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Nakamura et al.('422)

9. With respect to claims 12 - 14, Nakamura et al.('422) show a group III compound semiconductor device (see Figure 1) with a p-type upper layer 13 and an electrode consisting of a layer of Ni with a layer of Au on top (column 5, line 49). Figure 7 shows a modification of the Figure 1 device which has a contact layer 15 and a bonding pad 17 that covers part of layer 15 and has a protective film of silicon oxide (column 10, line 26). The other properties in claim 12 are inherent in the materials.

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10. With respect to claim 21, Nakamura ('422) shows a structure with a AuNi layer covering part of a Ni and Au layer and will inherently have the same properties as claimed.

***Claim Rejections - 35 USC § 103***

11. Claims 1, 2, 4 - 11, 20 and 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al.('422) in view of Manabe et al. and Nakamura et al.('350).

12. Nakamura et al.('422) show a group III compound semiconductor device (see Figure 1) with a p-type upper layer 13 and an electrode consisting of a layer of Ni with a layer of Au on top (column 5, line 49). Figure 7 shows a modification of the Figure 1 device which has a contact layer 15 and a bonding pad 17 that covers part of layer 15 and has a protective film of silicon oxide (column 10, line 26). Nakamura et al.('422) show that the electrode layers are transparent (column 6, line 31). Nakamura et al.('422) also show that the bonding pad 17 is composed of Ni and Au but teach against the use of Al (in a two layer structure) since it can migrate to the electrode and can degrade it. Manabe et al. show the use of Al in a multilayer electrode stack (see Figure 6 and column 5, line 38) which has improved operating characteristics. It would have been obvious to modify the Nakamura et al.('422) device to include the Al layer as taught by Manabe et al. with the expectation that the two intervening layers will protect the electrode from deterioration. Nakamura et al.('422) also teach annealing at 600 degrees (column 7, line 38) and teach the LED compound is  $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$ . Nakamura et al.('350) show that the silicon oxide protective layer is  $\text{SiO}_2$  (column 34, line 66). The remainder of the claimed features are inherent in

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the choice of materials. Forming the layers in the sequence Ni-Au-Al follows the decreasing sequence of work functions and would also be obvious.

13. With respect to claim 20, Nakamura (422) shows a structure with a AuNi layer covering part of a Ni and Au layer and will inherently have the same properties as claimed.

### *Conclusions*

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

15. A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A. Wille whose telephone number is (703) 308-4949.

17. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose number is (703) 308-0956.

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Olik Chaudhuri  
Supervisory Patent Examiner  
Art Unit 2814

DAW *Daw*

October 5, 2000